**TEESSIDE UNIVERSITY - SCHOOL OF COMPUTING, ENGINEERING AND DIGITAL TECHNOLOGIES**

**ICA 2 SPECIFICATION (70%)**

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| **Module Title:**  Networks & Security | **Module Leader: Nauman Israr** |
| **Module Code: CIS1008** |
| **Assignment Title:**  ICA 2 – Network Design + Implementation in Packet Tracer + Documentation | **Deadline Date: 3 May 2023**  **Feedback Due : 02 June 2023** |
| **Deadline Time: 4:00;** PM |
| **Submission Method: Online via Blackboard Ultra.** |

**~~Central Assignments Office (Middlesbrough Tower M2.08) Notes:~~**

* ~~All work (including CDs etc) needs to be secured in a plastic envelope or a folder and clearly marked with the student name, number and module title.~~
* ~~An Assignment Front Sheet should be fully completed before the work is submitted.~~
* ~~When an extension has been granted, a fully completed and signed Extension form must be submitted to the SCM Reception.~~

# Online Submission Notes:

# Please follow carefully the instructions given on the Assignment Specification

# When Extenuating Circumstances (e.g. extension) has been granted, a fully completed and signed Extenuating Circumstances form must be submitted to the School Reception or emailed to scedt-assessments@tees.ac.uk.

# FULL DETAILS OF THE ASSIGNMENT ARE ATTACHED INCLUDING MARKING & GRADING CRITERIA

**Assessment Criteria**

All parts of the component must contain your name and student ID

This component is worth 70% and, based on the scenario provided below, will assess:

* Your network design +Implementation.
* Provision of accurate and appropriate technical requirements.
* Provision of an appropriate solution.
* Identification of security risks and mitigation.
* Identification of ethical and legal issues.

***Scenario:***

An trading floor Support centre employs 700 staff. They have recently expanded and as a result, need to move to a new building. A building has been identified but has no network. This means that before they can make a move a whole, new network service needs to be designed and implemented in the new building. Existing Network comprises of the following elements:

***Existing Network:***

* Desktop machines are running a mixture Windows seven SP2, Windows 11 and Ubuntu 18 as an Operating System.
* Servers are running Windows 2016 with Domain controller.
* Wireless Access Points uses WPA2.
* Subnets are class-based IPv4.
* Main Layer two Protocol is Spanning Tree.
* The main routing protocol is RIP v1.
* Physical layer cabling is CAT 5e.
* Open source web server and anti-virus software are in use.
* Servers and key network infrastructure are located on the ground floor.
* Full and incremental backups are stored on a server located on the ground floor.
* Key network services use a single 15 character password for authentication.
* USB and external adaptors are allowed.
* Executables files are automatically blocked by the email server (MS Exchange).
* Non used network ports are blocked.
* End users are not permitted to install software.
* Network Hardware is provided by Cisco and only accessible to the IT technicians but can be accessed via a network (Access via the network is password protected.).
* Remote access to network equipment is via telnet.
* End users have basic IT knowledge.

**Requirement for the new Network**

The organisation has the following requirements for its new network: -

* That the service be available between the hours 8 am and 6 pm
* That the service provides 99.9% availability during these times
* That the network is secure and has an internet connection
* That the network provides a reliable service
* The network should provide high performance for the end-users
* The new network should have sufficient capacity to support the business for five years.

As a key member of the Networks Team, you have been tasked to design a network for the new building. At this stage, logical design is required, which shows the measures that you would put in place to ensure that the new network meets the current business need and is future-proofed.

# Products:

* ICA 2 (70%): Proposed Network Design, Implementation and supporting documentation, Deadline: 3 May 2023 , 4 pm
  + A diagrammatic representation of the logical design professionally produced using an appropriate tool, e.g. Visio, Opnet.
  + A fully operational network in packet tracer (screen capture of connectivity must be documented, Maximum 10 screen shots).
  + A valid subnet for the proposed solution. The same subnet must be used in the implementation.
  + A report (approx. 2000 words) providing documentation for the design including a discussion of:

1. The design you have developed for this scenario, including the hardware, topologies, protocols and software choices you have made. Discussion on the choice of protocols for layer 1, 2 and 3.
2. The security issues you have identified and what processes and policies can be used to mitigate the risks.
3. The ethical and legal issues that need to be considered in network design and management.
4. Reflection on how well the solution meets the business requirements

The report and the diagram must be submitted via Blackboard on or before the deadline.

Note: Word count limits for both elements is 3000 words.

**Appendix**

**Learning Outcomes**

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| Module Learning Outcomes |
| **Personal and Transferable Skills**   1. Produce supporting documentation that effectively summarises key information, adopting a professional approach. 2. Identifying network security risks and their remediation. 3. Apply the fundamentals of network design, deciding on appropriate hardware, protocols and software.   **Research, Knowledge and Cognitive Skills**       4. Demonstrate an understanding of the role of networks and security in modern IT environments.       5. Design a network to meet specified business requirements and select appropriate network technologies and topologies.       6. Undertake a security risk assessment for a simple system and propose basic remediation advice.       7. Evaluate to what extent a network design meets specified business requirements and/or objectives.  **Professional Skills**        8. Work autonomously with limited direction to produce a network design for a given scenario.       9. Discuss the ethical, social and legal issues surrounding the management of a modern networked environment. |

**Learning Outcomes Degree Apprenticeship:**

C1 : Critically analyse a business domain in order to identify the role of information systems, highlight issues and identify opportunities for improvement through evaluating information systems in relation to their intended purpose and effectiveness

C4 : Undertake a security risk assessment for a simple IT system and propose resolution advice. Can identify, analyse and evaluate security threats and hazards to planned and installed information systems or services (e.g. Cloud services).

C13: Analyse common vulnerabilities in computer networks including unsecure coding and unprotected networks.

C14: Evaluate various roles, functions and activities related to technology solutions within an organisation.

C16: Deliver a technology solutions project accurately consistent with business needs.

C29: Perform under pressure

C30: Take a thorough approach to work

SE2: Undertake analysis and design to create artefacts, such as use cases to produce robust software designs.

SE6 Deliver software solutions using industry standard build processes, and tools for configuration management, version control and software build, release and deployment into enterprise environments.

Marking Criteria

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| Network Design +Implementation | 20 |
| Protocol and design discussion | 20 |
| Security & Ethics | 20 |
| Presentation | 10 |

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| **Part 2 – Design Report (2000 words)** | |  |
| **Network Design + Implementation + IP** | To obtain maximum marks, you need to:-   * Produce a detailed, documented network diagram + implementation in response to the information provided in the ITT. Your design will consist of diagrams and test results screenshots for the campus network * Your design should clearly show the measures you have included that address the business and technical requirements. The document should be professionally presented using a tool such as Visio and Packet Tracer. * The design should include a valid subnet solution along with an explanation. The subnet must map to the design diagram and business requirements. | 20% |
| **Protocol and design discussion** | To obtain maximum marks: -   * The report must provide a description for the model, design and all of the decisions that you have made in the process of developing the design and how these are linked to the business and technical requirements described in the ITT. * The report must clearly identify and discuss the relevant protocols and hardware used to design this network and how the protocols meet the requirements in the ITT. Restrict your discussion to Layer 1 , 2 and 3. | 20% |
| **Security & Ethics** | To obtain maximum marks: -   * The report must include a discussion on security measures used to protect network along with consideration of legal and ethical issues. | 20% |

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| **Part 3 – Presentation** | To obtain maximum marks:-   * Ensure all of your documents are word processed or produced using suitable tools. * Ensure all documents are clear, and easy to read with few errors. * Use professional presentation methods :-   + Table of contents (where appropriate)   + Version control information   + Supported by diagrams/graphics where appropriate * Ensure all documents are clearly labelled with your name and the document title. | 10% |
| **Total** | | **70%** |